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HON. RENE BRUNELLE, MINISTER W. Q. MACNEE, DEPUTY MINISTER

ONTARIO
FISH AND WILDLIFE
REVIEW

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THE COVER

Bruce Colvin's quick study of a mallard in flight is calculated to draw your eye to Professor Colin Young's promotion of nesting rafts for ducks. The back cover offers one of the chubby little toads that Allan Wainio believes you should treasure. Both stories in this issue.

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CONSERVATION – PRESERVATION

– Same? – Different? – Not Necessarily!

With the increasing awareness of people of the need for wise management of our renewable and non-renewable natural resources, *conservation* and *preservation* have become everyday words. As one listens to these words being used, it is apparent that they are often applied incorrectly.

Perhaps the best definition of conservation is *wise use* with equal emphasis on *wise* and *use.*

In fish and wildlife management, programs for a particular species could range all the way from long open seasons, with liberal creel or bag limits, to a complete closure of seasons and no provision whatsoever to allow for a harvest of any portion of the population. Both extremes are *conservation* as both constitute wise management, but the former provides for much use and the latter for no use. This latter management scheme can properly be termed *preservation* at the same time that it is part of the conservation program.

Thus we see that *conservation* is a generic term referring to a sound management program, whereas *preservation* is a specific type of management technique, applied to a particular species (usually in specified areas) to effect conservation of that species.

It stands to reason that if a conservation program is sound, then resort to *preservation,* as a type of management scheme, should not be necessary since over-use of the animal population, or destruction of significant portions of habitat, should not occur.

It also stands to reason that if *preservation* is practised where populations have reached the carrying capacity of their range and are just about to destroy, or are destroying, their range, then this act of preservation is not conservation.

It is obvious that all of *conservation* is not *preservation,* and *preservation* is not necessarily *conservation.*

Lake Superior lake trout from Mishibishu Lake: a nine-year-old and a four-year-old. Photo by R. Wolfe.

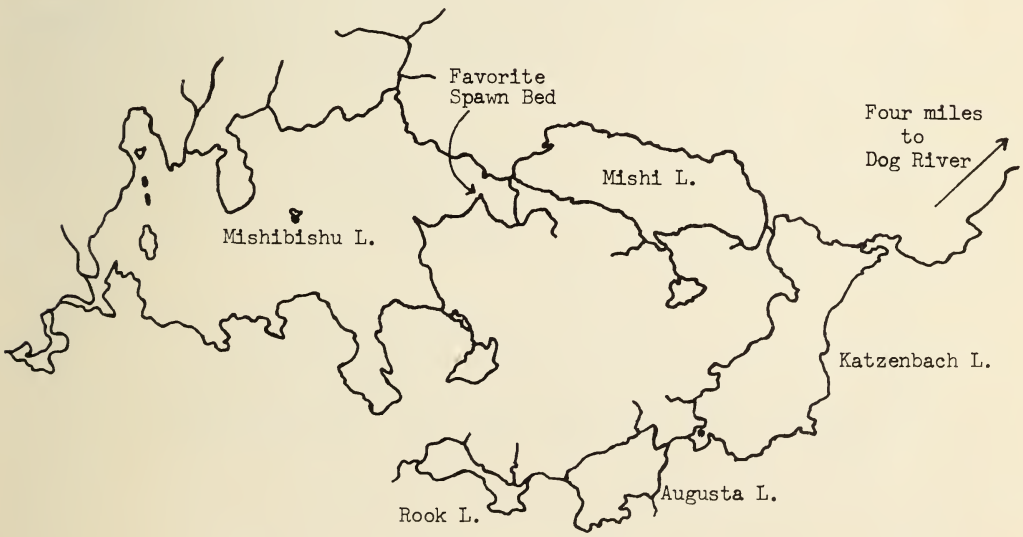
THE CASE OF THE SUBSTITUTE LAKE

by T. G. Harrison
Biologist, White River Forest District

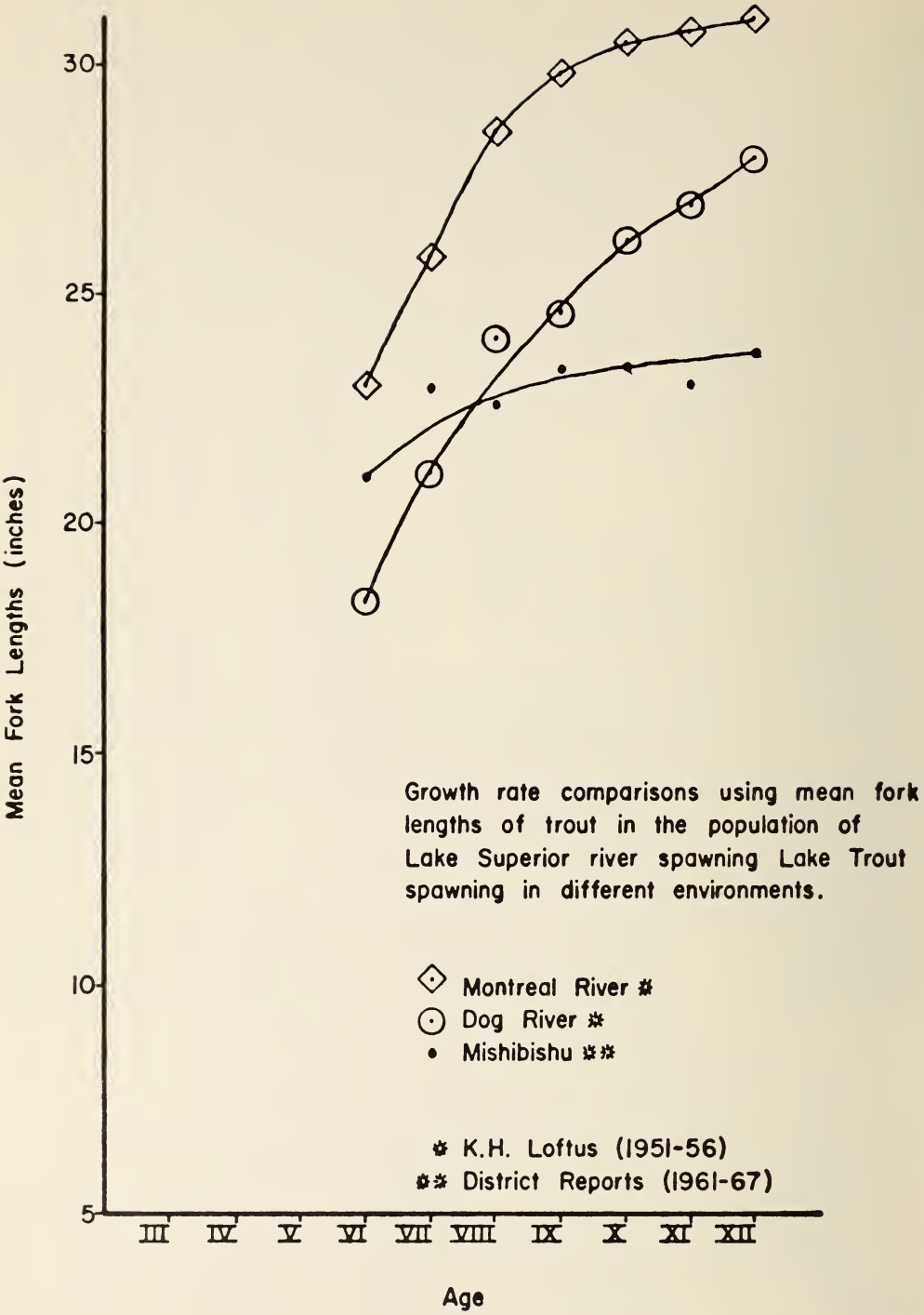
The restoration of Lake Superior lake trout, now well advanced, is due in part to a survival program begun by the Department of Lands and Forests in 1955. By that time, the lake trout population had dropped to two-thirds its former level and was plainly on the skids due to predation by the newly-introduced sea lamprey. It was then decided to try to ensure the survival of the Lake Superior strains of lake trout by transferring breeding stock to an isolated lake so that the big lake could be re-stocked with its own races of lake trout at a later date.

In the fall of 1955, spawn was collected from the relatively rare river-spawning strain near the mouth of the Dog River which is located fifteen miles west of Michipicoten Harbour. The eggs were hatched and reared for two and a half years at Tarentorous Hatchery in Sault Ste. Marie.

During this time, a search was made for a suitable lake in which to plant these trout. The ideal lake would be one in which lake trout were not present so that the Lake Superior stock would not be diluted, but one which at the same time provided excellent lake trout habitat. The most suitable lake found was at the head-waters of the river where the trout spawn was collected. This portion of the Dog River system, known as the Mishibishu chain of lakes, consists of four lakes linked by short creeks, each lake being over 100 feet deep.



The Mishibishu chain of lakes. Scale: 1¼ miles = 1 inch.


Mean Fork Lengths (inches)
30
25
20
15
10
5
III
IV
V
VI
VII
VIII
IX
X
XI
XII
Age
Growth rate comparisons using mean fork lengths of trout in the population of Lake Superior river spawning Lake Trout spawning in different environments.
Montreal River *
Dog River *
Mishibishu **
* K.H. Loftus (1951-56)
** District Reports (1961-67)

Mishibishu Lake, with an area of 2,062 acres, was chosen for the planting site.

The only fish present in these waters were a small population of white suckers and several species of minnows.

During the early summer of 1958, 4,000 trout were planted in Mishibishu Lake, 5,000 were planted at the mouth of the Dog River, and the remaining portion were held at Tarentorous Hatchery. Each trout planted in Mishibishu was marked by removing the adipose fin. To protect the lake trout, all the lakes in the chain were closed to angling.

In 1961, sampling showed that the fish had grown rapidly and were maturing early. We had picked a good lake.

In 1962, full scale spawn-taking operations began in Lake Mishibishu and have been carried out every year since. During the period 1962-8, a total of 510,000 eggs were collected from 175 trout. Trout hatched from these eggs have been used to stock Lake Superior, as well as a few inland waters.

Although there are five small creeks flowing into Mishibishu Lake, to date none have attracted any river-spawning lake trout. The principal spawning location appears to be off a point on the windward side of the lake close to the only outlet. The bottom drops off quickly here and is covered with rounded stones of various sizes. These characteristics are probably attractive to this population because of wave action and current, which approach the same conditions selected by their predecessors in the Dog River.

During the fall of 1965, it became apparent that the growth rate of Mishibishu trout had been extremely slow during the previous three years. Trout grew quickly until maturity, but growth virtually ceased after spawning for the first time. The trout which had entered Mishi and Katzenbach Lakes demonstrated a faster growth rate than those remaining in Mishibishu, almost surely due to the greater forage available per fish in these lakes.

Upon examination of stomachs, Mishibishu trout were found to be feeding primarily on plankton and insect larval and nymph stages with a sparse occurrence of crustaceans, small white suckers and minnows. Forage fish, required for a faster growth rate and greater egg production, were not abundantly available, particularly during the summer growing period when lake trout retreat to cooler depths. It is also during summer months that egg and sperm development are in progress. Under these food conditions, we believe that egg and sperm production demanded most of the nutrients while a very limited amount was used for body growth.

In an effort to remedy this problem, cisco (lake herring) were introduced into Mishibishu since these fish are year-round food supplies of trout in other waters. Herring eggs were collected in the fall of 1965 and 1966 from Lake Superior and held in the Thunder Bay Hatchery until they reached the eyed stage. At this stage of development, eggs can be handled with a minimum of loss. About mid-March in 1966 and 1967, the eyed eggs were flown to Mishibishu Lake and planted beneath the ice in two to ten feet of water.

Both herring plants were successful. The herring grew rapidly with total lengths averaging 6.2 inches after a half year's growth and 9.2 inches after one and a half year's growth. Almost 41 per cent of the males and 18 per cent of the females (Age 1½) examined from the 1966 planting were mature and would likely spawn during the fall of 1967.

Beginning in 1968, some trout were found feeding on the introduced cisco.

The Mishibishu lake trout project has achieved its initial purpose of preserving some original Lake Superior lake trout stock. Although egg collections to date from Mishibishu Lake have not been plentiful, we anticipate considerable returns when the abundant offspring from the original stock come into production.

Planting eyed herring eggs in Mishibislu Lake. Photo by T. G. Harrison.

The Conservation Officer in Northern Ontario

NO EQUAL FOR VARIETY

by C. A. Elsey
Fish and Wildlife Supervisor, Thunder Bay Forest District

"Jim, Jim—wake up! There's another jack-lighting complaint." And once again Jim is up and on his way to another of the varied activities of a conservation officer in northern Ontario.

A conservation officer's career probably has no equal for variety. Seldom are two hours and never are two days alike. Each day when an officer goes to work he wonders what it will bring—what will happen that's new and not quite like any previous experience.

Let us consider some of the events of the year from winter to winter.

There was a time when a conservation officer relaxed a little after New Year's. In those days, he could say to himself: "There is a job that must be done sometime, but it is not as urgent as the job at hand."

Maybe he could take a two-day snowshoe trip into a remote area to learn more about its geography and wildlife. Perhaps he could find time to spend a few days with a trapper on his line or a commercial fisherman on his lake, learning their business. Possibly he could drop in and spend a couple of hours with an old Indian trapper and hear something of the country's history. In this manner, he learned about the problems of these people, about their hardships and their way of life.

Things have changed. The mid-winter season for relaxing is gone. Where did it go?

Public demands on the officer's time have increased. The young teacher, full of enthusiasm, wants an officer to talk to her students on conservation. The Legion, Kiwanis, Lion's Club, church groups, campers' associations, and so on *ad infinitum,* want a discussion of recent developments in fish and wildlife management.

Big game hunting lasts until mid-December, and there is the last frantic hunt to fill the larder. After the last day of the legal hunt, it takes a few days for the hunting urge to subside; so Jim must still be in the field.

January is fishing time. The ardent angler ventures forth in spite of wind and cold. Lake trout fishing is better in winter than at any other time of the year. Yellow pickerel and northern pike are biting, too.

The advent of the snowmobile is one of the most important recent developments in winter recreation. Its impact on fishing and hunting can hardly be believed except by those who have been exposed to the new pressures. Now, hunters and fishermen seem to be everywhere. A Sunday fishing trip to a lake thirty miles from normal roads is commonplace with machines that travel from 20 to 30 miles per hour.

Week-ends now find the conservation officer in the bush. Frozen cheeks and toes are more common than in the old days. And a new hazard has been added. A mechanical breakdown can mean a night in the bush in sub-zero temperatures—or a long hike back for help. What's more, it happens!

There are some happy moments, too. How good it is to visit a group of sportsmen who have had some luck. What a pleasure to share a pot of coffee while listening to the

C. O. checks remote deer yard. Photo by W. D. Marshall.

tales of fishing and hunting. Or to huddle in a sheltered spot over a warm fire while the bitter cold wind whistles around. The officer hears the thrill in a man's voice on the last day of hunting–it's 30° below zero, and he is finally taking home the moose he worked so hard to shoot. His fingers are numb and the tip of his nose is white, but he's a happy hunter!

Jim is returning home. Tired and hungry, he has one thought in his mind–it's an awful nuisance to have to care for that snowmobile before he goes into the house for a hot meal and a quiet evening at home. But when he pulls into the yard, the O.P.P. are waiting. "There's an overdue fisherman. Can you help us to locate him?" So, without his proper meal, Jim gases up his machine and looks for extra lights and clothes. They are off into the darkness of a northern Ontario night to search for a lost angler–who, it turns out, went home by way of the local bar.

Surprises–well, Jim and his neighbouring officer didn't expect to run into a group of anglers with set lines at four o'clock in the morning in the middle of the winter. But the officers' surprise was little compared to that of the anglers.

Fishing is slower in March, but the days are longer and more pleasant. More people are out. Yesterday, Jim received a letter from his supervisor. It was a nice friendly letter, but the last paragraph read: "How would you like to leave on April 1st for a three-week course in fish management?" Well–can't afford to miss a chance for self improvement, can I?

There was a second letter: "We need someone to *volunteer* to collect all the available information on last year's bear hunt in the District and prepare a report.

C. O. tags a mallard. Photo by T. S. Jenkins.

Would you like to give it a try." Sure. It might be interesting. Jim is trained for this type of work, and so he writes the report although it's a bit difficult for an outdoorsman to stay in the office for a week.

After the long winter there comes the break-up and with it the preparation for spring. Winter gear must be put in storage, and spring and summer equipment has to be prepared and checked out. The fish and wildlife supervisor calls in all the conservation officers in the District for the annual spring meeting.

Then it comes: "The first pickerel are running into Bayfish Creek."

Who said a conservation officer works a forty-hour week? To some individuals, the urge for a meal of fresh pickerel is overwhelming at this time of year, and the fish are easy to catch because they are concentrated in creeks for spawning. Some people find the circumstance irresistable and use every imaginable dodge to take fish and thwart the officer. As for the officer, patrol work is dangerous sometimes. Have you ever waded through a rushing spring torrent at night to try to apprehend a poacher with a five-tined spear and have him mistake you for a fish? Many are the tales that officers have to tell of their encounters with poachers at this time of year.

Next is the season for nuisance beaver. Mrs. Jones' summer resort is being flooded; Clearwater Tourist Camp reports that its beautiful poplar are being cut by beaver; the Department of Highways is having trouble at several culverts; and the C.P.R. fears flash floods at two of its bridges. Each situation requires attention, and there is never a pat answer.

At the same time, the sportsmen's clubs are completing their spring hunter training

C. O. plants fish. Photo by T. S. Jenkins.

C. O. tags moose of successful hunter. Photo by F. Martin.

courses and require an officer to give a talk.

In the midst of all this, the fishing season opens, and with it comes the tourist trade. This is the time of year for talking to recreationists, providing them with information and collecting information about their activities. What is Jim asked? . . . .Where is the fishing best right now? What kinds of fish are biting? What is the latest in safety equipment for boats? What about bears? Wolves? Prospects for fall hunting? Land sales?

What kind of question does Jim ask? . . . How many fish have you caught? What species? Where did you take them? How much money did you spend on this trip? . . . In addition, Jim must check for licences and overlimits and the other things with which laws are concerned. He has to take some of these people to court, and this means he has to prepare his case, advise the Crown Attorney, and complete the forms.

Litter! Jim dreams about litter–cans, bottles (some broken on the beach), paper, fish entrails, toilet refuse–all the disgusting things that "civilized" man leaves to mar the wilderness. In his own way, Jim is carrying on a campaign to reduce littering.

When the spring fishing rush is over, boating, water skiing, picnicking and other activities take up more of people's time, but fishing remains popular. Jim has taken part in the fish planting program, and now he must assess the value of stocking in the various lakes by creel census. All the while, he continues to be plagued by nuisance bear and beaver problems.

At the meeting last spring, Jim was

assigned the responsibility of doing a survey on two lakes. He will be given the assistance of a University student for two weeks. It is difficult for Jim to fit this job into his full schedule.

By August, Jim finds that he has attended to ten road-killed moose and twelve deer. He has had to remove seven bear that were causing trouble. He feels that he must have investigated several hundred bear and beaver complaints although it was not more than forty. Among other activities, he has spent the better part of a week helping to locate the bodies of two anglers who drowned when their overloaded boat upset.

August is Jim's vacation time this year and, like the outdoorsman he is, he takes his wife and two boys on a canoe trip for two weeks. He's particularly interested in an area that might turn up some Indian artifacts. If he is lucky, the museum will benefit.

When Jim returns to his job, his desk has a neat stack of mail awaiting his attention. It's not big but some of it is time consuming –some letters describe projects he is to undertake–estimates of duck and grouse populations are required by District Office– the moose licences are in the safe; they must be delivered in person to each issuer, and all the rules carefully explained.

"Jacklighting" deer has started again, and he will be on patrol at night. Jim's wife always worries because she knows he may encounter poachers with loaded firearms. An added danger is that some of these people have had too much to drink. She doesn't forget the night Jim came home pretty shaken up after a jacklighter pointed a loaded gun at him for a while and then engaged him in a rough and tumble fight.

September 15th is the opening of the ruffed grouse and waterfowl seasons. This brings its usual quota of violations by hunters–loaded firearms in vehicles and power boats and other infractions of the Regulations. Jim is expected to keep a game bag census, and he must inspect and record the animals harvested by each hunter he contacts, the location of the kill, and the amount of hunting effort expended.

Jim must always keep in mind that his supervisor has to provide answers to the public on all aspects of hunting and fishing in the District. He keeps his supervisor informed on road conditions and hunting and fishing success. He tells him what areas are becoming congested with sportsmen and what areas could stand more–what are the dominant complaints–in general, what is happening in his area. Keeping up a steady flow of this type of information is a most important function of an officer in the field.

The big game seasons are on top of Jim all too soon. Preparations have included refresher courses in ageing moose and deer and meetings to discuss work loads and discuss enforcement problems. Jim has prepared himself as well as he can, but when a large number of hunters arrive, seemingly overnight, and scatter throughout the forest, the demands of the job don't give him much time for rest for the first three weeks of the big game season.

In the midst of this, the trappers show up for their licences, bringing with them many problems.

By November 1st, the hunting pressure has eased up a bit and the trappers' problems have been squared away. Jim can now find some time to do a little moose hunting for himself, using up his last vacation days.

The lakes are freezing over now, and angling comes to a standstill for a time. It looks like a time to relax and catch up at the office, but the respite is short.

Soon the ground is covered with snow, and hunters can range deeper into the bush with snowmobiles. A few hardy anglers search out remote lakes that were difficult to reach in the summertime.

All too soon, Christmas and then New Year's Day are with him. A year has slipped by. Jim can look back on days of enforcement, hunter bag checks, creel censuses, assisting trappers, and helping people.

A NESTING RAFT FOR DUCKS

by Colin M. Young
Associate Professor, Laurentian University, Sudbury
(Photos by the Author)

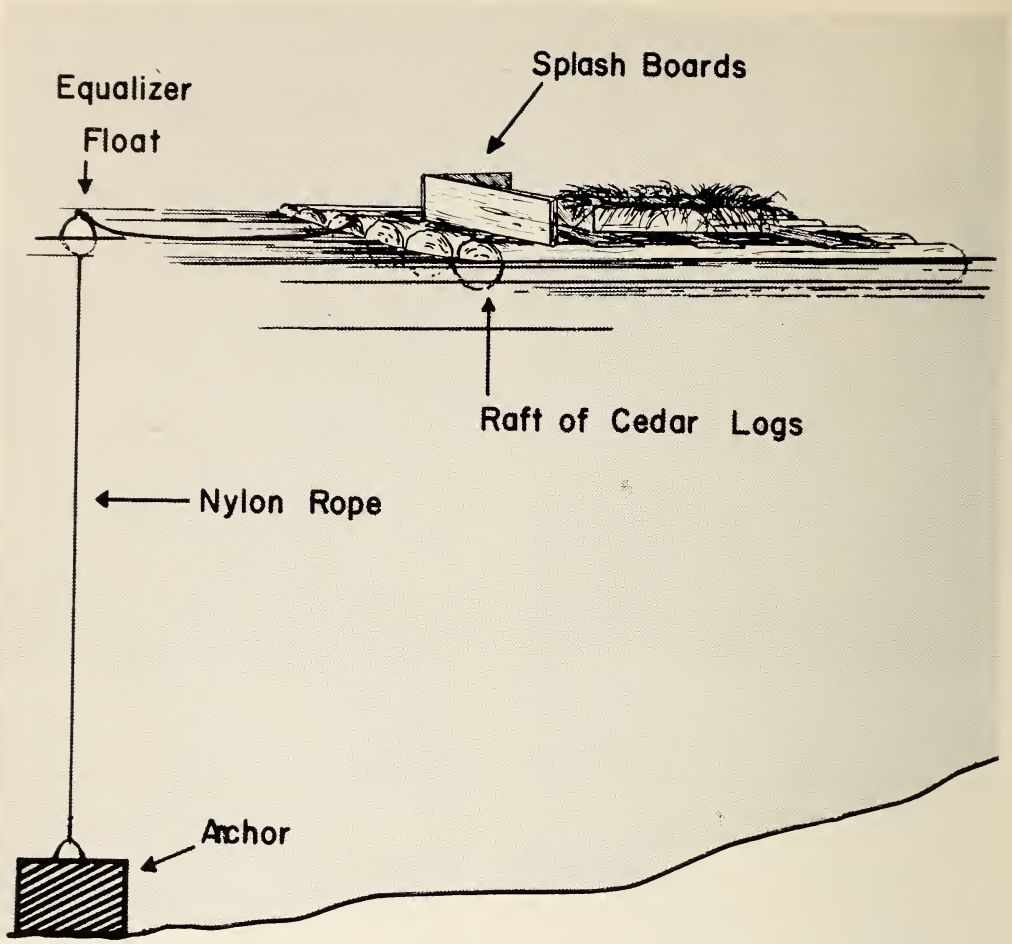
A nesting raft for ducks has been used successfully for five years on lakes and ponds in the Sudbury District of northern Ontario. Suitable for both black ducks (*Anas rubripes*) and mallards (*Anas platyrhynchos*), it is inexpensive and simple to construct. Provided that it is properly built and anchored well out from shore, it is relatively predator-proof.

This raft is particularly well suited to intensively managed waterfowl areas such as those that are administered by local conservation groups and fish and game clubs. The work at Sudbury was supported in part by a research grant from the Canadian National Sportsmen's Show.

Although there are thousands of small lakes and beaver ponds in northern Ontario, they produce few ducks per pond. The scarcity of predator-free nesting sites contributes to the poor hatching success. Ducks, which do nest successfully in this area, usually choose offshore islands in the larger lakes, presumably to escape mammalian predators. For the wildlife manager, the obvious solution to this problem is to provide safe, artificial nesting sites.

Man-made nesting devices are not new. They have been used extensively in attempts to increase duck production. Most of the earlier types were modifications of European designs, such as the pitcher-shaped wicker baskets from the Netherlands and the woven reed wigwams from Denmark. One of the more successful North American models is a type of open-ended cylinder which is attached to trees in flooded swamplands or mounted on poles in marshlands. Interest-

The duck nesting raft: a platform and nest box.



A duck nesting raft with modifications recommended by the editors.

ingly, there are no recorded incidences of any of these devices having been used successfully in the forested regions of Ontario.

The Sudbury Game and Fish Protective Association erected a large number of nesting cylinders around a small lake near Sudbury in 1963 and 1964, but none were used. The local ducks appeared to avoid these unnatural looking structures, so a more rustic, brush-covered raft was tried. This new design proved acceptable to both mallards and blacks.

The accompanying photos show the main structural details of this nesting craft. It is made of several six-foot cedar logs held together with two-by-fours. The nest box, placed near the centre of the raft, is 18 inches square and six inches deep. It is packed with leaf litter and screened with brush. The raft is then covered with cedar boughs to protect the nest from crows and owls. It is anchored several hundred feet from shore by means of a large rock and a length of sturdy, rot-proof rope.

The location of the nesting raft in the lake is most important. The usual inclination is to anchor rafts in small sheltered bays or narrow creek mouths. However, this simply increases the chances of predation. Mink, which are the most serious predators of duck nests in this area, will not swim out to the

The completed raft, camouflaged with cedar boughs.

rafts if they are placed well out in the lake. It was found that nesting birds are remarkably tolerant of wind and wave action provided, of course, that the nest boxes do not actually become flooded.

There is no problem with spacing once an area of open water has been chosen. Indeed, two or three nest boxes may be placed side by side on the same raft without risk of conflict between the occupants.

Spring break-up signals the time to get the rafts out on the lake. In the Sudbury area, the lakes are usually ice-free by the first week of May, and ducks take possession of the rafts as soon as they are available. In the majority of cases, the first egg was laid within three to four days after the raft was set out. (In several instances, the first egg was laid on the same day.)

Cost is not usually a problem. All of the building materials are available locally, and one man, working full time, can put together six to eight of these rafts per day once the materials have been gathered on the site.

In 1965, six rafts were tested. They were put in place on May 3rd. Within three days, three of the rafts were occupied. The attractiveness of at least one of the rafts was demonstrated by the fact that three different ducks used it. First, a black duck laid a full clutch of 12 eggs in the nest box; then, a mallard added another 11 eggs; and finally, a second mallard added a few eggs of her own and shared in the incubation of the huge clutch.

In 1966, twelve rafts were set out and six were used, three by mallards and three by blacks. In 1967, fourteen of the eighteen available rafts were occupied. Quite often, more clutches were laid than there were rafts available as some of the rafts had more than one nest box. Occasionally, individual boxes were occupied by a succession of nesting birds.

Nesting rafts are not a panacea for all of the problems ducks have in Ontario. The success of the Sudbury experiment does show, however, that many of the lakes and larger ponds in Ontario would be ideal locations for nesting rafts. How about you rafting a duck?

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Without natural controls, tent caterpillars can wreak havoc.

Spiders consume many times the number of insects eaten by birds.

NATURE – THE MASTER PEST EXTERMINATOR

by Allan Wainio
Biologist, Lake Simcoe Forest District

The "perfect insecticide", which kills only the pest insect and is not toxic to anything else, has yet to be invented. It seems improbable that so perfect a tool will ever be manufactured.

Throughout the environment, in rivers, lakes, fields and forests, there exist the ever-present natural controls which many people are only now beginning to study thoroughly and appreciate.

Natural controls of insects have always existed, but man's desire for sophisticated chemical controls has partially blinded him to their effectiveness. In overrunning the earth, man has often upset ecological balances. In endeavouring to rectify matters, his methods have been unnatural and sometimes dangerous.

As many people realize, natural checks on destructive insect populations are provided by biological controls such as diseases, parasites, predation and habitat management. Man can manipulate these controls to his advantage–so well, in fact, that one leader in the field has asserted that "with sufficient knowledge all pests can be controlled biologically".

However, there are many people who are unable to adjust mentally to the idea of working with nature instead of trying to dominate her. To them, simple biological control is too simple. They refuse to admit that their pride in man's ability to control nature has been rebuked. Natural biological control requires that the gardener and the farmer put more trust in nature.

Insects, the most numerous class of animals in the world today, have been popularly regarded as villains. This is an unfortunate misconception for many insects are natural predators on other insects, providing a check on the wholesale spread of some species harmful to plants, animals and men.

Here are a few of the "good guys".

Dragonflies, swift and graceful, are among our most valuable predators. they have an extraordinary appetite for mosquitoes–one observer found more than a hundred mosquitoes in the mouth of a dragonfly. Their highly developed eyes and speed awing enable them to catch in flight the mosquitoes and other small insects that are their only food. Their legs form a sort of basket into which their prey is deftly placed. The dragonfly, while still flying, promptly devours the insects with its stout jaws.

Ants exhibit a wide range of feeding habits and were the first insects used for biological control. Centuries ago, the Chinese and Japanese collected ants and transferred them to cultivated areas to protect date and mango trees from destructive insects. In tropical countries, it is a common practice to encourage ants to live around warehouses because they are enemies of termites. In Germany, ants were recognized as protectors of forests from beetles and other pests, and a law was passed in 1880 protecting them from human interference. A 1936 statute, replacing the old one, is still in force today.

Praying mantids, odd-looking relatives of the grasshoppers, have acquired the name from the position they assume as they rest on twigs or stalk their prey. They are

The killdeer is a voracious eater of insects. Photo by C. Van Gemerden.

valuable pest controllers because of their selective diets and voracious appetites. Their daily menu consists almost entirely of destructive garden insects, and they are particularly fond of the sucking and cutting varieties, the ones which inflict the greatest damage on food crops, trees and flowers. Young mantids feed on aphids, caterpillars and other soft-bodied insects, while the older ones are able to capture and consume many additional, larger pests. Furthermore, both young and old mantids are completely harmless to plants.

To the delight of gardeners seeking natural protection, mantids are surprisingly easy to introduce into any pest-infested area. Each female deposits several egg masses in a season. The egg case has a hardened, rough-textured covering which protects the eggs through the sub-zero temperatures of winter. In the spring, the young mantids appear and begin their season of gluttonous garden care.

Tie a few egg cases where the services of mantids are needed. For adequate protection, one egg case for each major shrub or tree is sufficient; four cases will do for each quarter-acre without shrubbery. Once introduced, they will remain in the immediate area and continue their protective program by depositing their eggs in the fall for the next year. They are ideal for greenhouses, too.

Wasps are another effective means of biological control. They feed mostly on other insects such as destructive caterpillars. Their nuisance to man, because of their vicious stinging, is far outweighed by the benefits derived from their predacious habits.

Take the "loathsome" spider. One investi-

The woodpecker eats large numbers of spruce beetles.

gator concluded that the weight of insects, eaten annually by spiders in England and Wales, exceeded the weight of the human population. Spiders consume many times the number of insects eaten by birds. Indeed, one biologist even suggests that the relentless pursuit of insects by hunting spiders contributed to the evolutionary development of wings by insects, and the evolution of the web spinners in turn to meet the new challenge of the flying insects.

Spiders were found to be the most effective predators of spruce budworms in the conifer forests of New Brunswick. Unfortunately, the insecticide spraying program to control the budworm also reduced the spider population. Another species of spider eradicated bedbugs from Greek refugee camps near Athens following World War I.

Although spiders do gobble up some beneficial insects and many people shudder at the sight of them, they should be shown respect and allowed to inhabit our gardens, garages and cellars.

Never underestimate the value of birds. According to one authority: "As enemies of insects, birds stand supreme among vertebrates." More than half the food consumed by the 1,400 species and sub-species of birds in North America consists of insects. It has been estimated that the insect-eating bird population of Massachusetts is 25,600,000, and that these birds consume 2,560,000,000 insects per day.

Sometimes birds can bring about control of a local outbreak of insect pests. In 1848, gulls saved the small crop plantings of the Mormon settlers from a severe infestation of crickets. So grateful were the Mormons that they erected a monument to the gulls

commemorating the event which they regarded as a visitation of Providence.

Woodpeckers are regarded as being of great economic value to man in the destruction of insects that harm forest trees. These birds energetically eat vast amounts of spruce beetles. In the pine areas of southern United States, foresters consider woodpeckers to be the only effective control for bark beetles–any other form of control would outweigh the value of the timber. In Quebec, birds, especially woodpeckers, were mainly responsible for the final collapse of a serious outbreak of spruce budworms.

Woodpeckers are also extremely valuable in orchards. The codling moth, a troublesome pest in apple orchards, has been effectively controlled by woodpeckers in Nova Scotia and Quebec.

Birds that feed on the hibernating larvae of the corn borer can reduce significantly the populations of this destructive insect.

The killdeer, a voracious eater of grasshoppers, beetles, caterpillars and other pests of field crops, is a valuable ally of the farmer. A single family of bobwhites, living in a potato patch, can keep the potato beetle under control. It has been observed that orioles have entirely destroyed a local infestation of tent caterpillars in an orchard. The meadowlark is unequalled as a destroyer of cutworms, caterpillars and grasshoppers.

How true is the assertion by one authority that "the insect-suppression value of birds to agriculture clearly runs into the hundreds and even thousands of millions of dollars annually".

Some small mammals, such as moles and shrews, are also valuable predators on insects. Though at times they may be destructive to lawns and crops, they destroy many soil-inhabiting insects such as white grubs and cutworms. In some areas, mice and skunks are important in controlling caterpillars and grasshoppers. Since skunks have insects as main items in their diet, they are valuable friends of the farmer and fruit grower.

Are you having trouble with cockroaches in the kitchen? Well, don't run to the nearest hardware store for the latest cockroach poison. Take a stroll by some pond or stream, catch a chubby little toad, and bring him home. Toads just love lapping up those cockroaches. Lock the toad in the kitchen for a few nights, and your cockroach problems are over. By then, you will have the fattest toad in town.

The toad is a true friend of the gardner; nearly 90 per cent of the toad's food consists of insects, most of which are harmful. In three months, a toad will eat up to 10,000 insects, especially enjoying slugs and mole crickets. Some golf course operators are aware of this, and one southern United States club runs a children's Saturday movie matinee every spring with the price of admission being a live toad.

The toad relishes yellow jackets, wasps, rose beetles, moths, caterpillars, flies and squash bugs. In Europe, toads are collected and sold to horticulturists.

Toads possess a certain amount of homing instinct. So, if you import yours from a distance, keep them penned up for awhile so they can adjust to their new environment. Set out several "toad houses" to encourage toads to stay in your garden. Turn a clay flower pot upside down, break a small hole in the side for a door, and bury it several inches in the ground, preferably under a small undergreen. The toad must have access to water, so keep a shallow pan filled in the garden.

The male toad has a song ringing with peace and tranquility. Could you ever find this in a can of poison spray?

The philosophy in the saying, "use a thief to catch a thief", can be applied to our battle with the insect hordes. Remember: many of the so-called harmful and obnoxious insects are in reality beneficial. Learn to comply with Nature's ways. When it comes to pest control, Nature cries out to us: "Don't spray me. Use me!"

The skunk delights in gorging on bugs.